

New Double Charm Baryon States From SELEX

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The SELEX experiment at Fermilab has published the first evidence for a double charm baryon Ξ_{cc}^+ at 3520 MeV/c² (PRL 89,(2002) 112001). An SU(4) multiplet of ccq baryons, as expected from Quantum Chromodynamics, requires a (ccu) partner state with charge +2. SELEX has reported a candidate state with Q=+2 at 3460 MeV/c², but this mass splitting is very large for an isodoublet.

Recent analysis has revealed two new double charm candidates. This quartet of states is grouped as a pair of isodoublets. The isodoublet mass splitting is 20 MeV and the mass separation of the pair is 78 MeV. Decay angle analysis shows that the lower-mass pair is consistent with isotropic decay, but the upper pair is not. All four states appear to decay weakly, but the decay times are much shorter than expected from phenomenological extrapolations of the single-charm lifetime spectra based on the HQET expansion.

I will review the analysis procedure and describe the features of these double charm candidates. I'll summarize the issues that these results present for our understanding of the states as double charm baryon decays.